WHAT IS CLAIMED IS:

1. A method for removing energy from a semiconductor device on a substrate, comprising:

forming a lid having at least one cavity, the at least one cavity operable to receive at least one die mounted on the substrate;

depositing a conductive layer within the at least one cavity, the conductive layer comprising a material having a thermal conductivity greater than 10 W/m-°C, and operable to conform to the shape of the die; and

mating the lid to the substrate, wherein the mating comprises an assembly by placing the at least one cavity over the at least one die, the at least one die substantially surrounded by the at least one cavity, and the conductive layer filling the space between at least a first face of the lid and a first face of the die.

2. The method of Claim 1, further comprising heating the first assembly, the heating operable to lower the viscosity of the conductive layer, the lowered viscosity operable to distribute the conductive layer at least between the first face of the lid and the first face of the die.

3. The method of Claim 2, further comprising:

cooling the first assembly, wherein the cooling increases the viscosity of the conductive layer, the increased viscosity operable to retain the shape of the conductive layer within the at least one cavity,

removing the lid from the substrate, the conductive layer remaining in the at least one cavity; and

creating a second assembly by mating the lid to the substrate, wherein the lid is secured to the substrate in substantially the same position as the first assembly.

4. The method of Claim 1, wherein the conductive layer comprises a metallic solder.

5. The method of Claim 4, wherein the solder comprises a utectic Sn-Pb solder.

6. The method of Claim 4, wherein the solder has a melting point of less than 200 °C.

7. The method of Claim 4, wherein the solder comprises an indium-based solder.

8. The method of Claim 4, wherein the solder comprises a lead-tin solder.

9. The method of Claim 4, wherein the solder is lead-free.

10. The method of Claim 1, wherein the conductive layer is a conductive thermoplastic.

11. The method of Claim 10, wherein the conductive thermoplastic is silver-filled.

12. The method of Claim 1, wherein the at least one die comprises at least two dies, the at least two dies comprising dies of varying height.

13. The method of Claim 1, wherein the at least one cavity comprises at least two cavities with similar dimensions, and wherein the at least one die comprises at least two dies of varying height.

14. The method of Claim 1, wherein the semiconductor device is a multi-chip module.

15. A system for dissipating heat from a semiconductor device, comprising:

a thermally conductive lid, comprising at least one cavity corresponding to at least one die mounted on a substrate; and

a conductive layer deposited in the at least one cavity and having a melting point greater than the maximum operating temperature of the semiconductor device, the conductive layer operable to substantially fill a space between the at least one cavity and the at least one die when the lid is coupled to the substrate.

16. The system of Claim 15, wherein the conductive layer is further operable to assume a liquid state when heated, the liquid state operable to distribute the conductive layer within the space between the at least one cavity and the at least one die when the lid is coupled to the substrate.

17. The system of Claim 15, wherein the conductive layer is a eutectic solder.

18. The system of Claim 15, wherein the conductive layer is a lead-tin solder.

19. The system of Claim 15, wherein the conductive layer is an indium-based solder.

20. The system of Claim 15, wherein the conductive layer is a silver-filled epoxy.

21. The system of Claim 15, wherein the conductive layer is an epoxy having a thermal conductivity greater than 10 W/m-°C.

22. The system of Claim 15, wherein the at least one cavity corresponds to at least two dies mounted on the substrate, the at least two dies operable to fit inside the at least one cavity when the lid is coupled to the substrate.

23. The system of Claim 15, wherein the at least one cavity comprises at least two cavities, and wherein the at least one die comprises at least two dies, each cavity corresponding to at least one of the at least two dies mounted on the substrate.

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24. A method for dissipating heat from a semiconductor device, comprising:

forming a lid having a cavity corresponding to each die mounted on a substrate, the lid having a thermal conductivity of at least 100 W/m-°C;

depositing a conductive layer within each cavity, the conductive layer having a thermal conductivity greater than 10 W/m-°C and operable to become liquidous when heated to a temperature greater than the maximum operating temperature of the semiconductor device;

coupling the lid to the substrate to form a first assembly, the coupling operable to place each die in each cavity;

heating the assembly, the heating operable to liquefy the conductive layer, the liquefaction operable to mold the conductive layer to the surface of each die and each cavity;

cooling the assembly to solidify the conductive layer;

removing the lid from the substrate; and

creating a second assembly, the second assembly comprising the lid coupled to the substrate in substantially the same position as in the first assembly, the second assembly further comprising an adhesive layer operable to secure the lid to the substrate.